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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/583,258	06/16/2006	Walter Vermeiren	Q95343	9119

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EXAMINER	
SINGH, PREM C	

ART UNIT	PAPER NUMBER
1797	

MAIL DATE	DELIVERY MODE
12/05/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/583,258	VERMEIREN ET AL.	
	Examiner	Art Unit	
	PREM C. SINGH	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *06/16/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102/103

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 2, 4, 5, 10-14, 16 and 17 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Chun et al (US Patent 3,746,637).

4. With respect to claim 1, Chun discloses a method of purification of light hydrocarbons with cut point between 50-700^{o}F (10 and 372°C), containing sulfur compounds that are refractory to the usual hydrofining treatments, characterized in that it comprises (See column 1, lines 14-24, 32-40; column 6, lines 21-24):

(a) a stage of oxidative polymerization of the compounds comprising an -SH group in a hydrocarbon ring (See column 1, lines 32-34), in the presence of at least one oxidizing agent selected from the metal cations (See column 1, lines 14-24; column 5, lines 11-15);

(b) a stage of separation of the polymers formed and of the oxidizing agent with the light hydrocarbons (See column 7, lines 31-37), and

(c) a stage of oxidation of the metal cation (See column 6, lines 66-75; column 7, lines

1-4); these stages being carried out in that order, it being possible for each of these stages to be combined with at least the next stage (See column 7, lines 5-36).

It is to be noted that Chun invention does not specifically disclose the process as oxidative polymerization, however, the invention does disclose oxidative coupling of two mercaptan molecules to give a disulfide (See column 1, lines 36-40). Obviously, the process is oxidative polymerization (oligomerization).

Chun invention does not specifically disclose the sulfur/nitrogen compounds with 5 to 6 ring members, however, it is expected that the feedstocks used by Chun invention should necessarily have sulfur compounds comprising 5 to 6- ring members, as claimed because Chun is using similar feed stocks as claimed by the Applicant (See column 1, lines 36-40; column 6, lines 21-31; column 8, Table I).

Alternatively, it would have been obvious to one skilled in the art at the time of invention to modify Chun invention and specify the ring numbers of sulfur compounds for proper characterization of the feed.

5. With respect to claim 2, Chun discloses that the metal cations are introduced either in solution or on various supports (See column 1, lines 41-43).

6. With respect to claim 4, Chun discloses that that the metal cation is a cation of a metallic element of the group comprising iron and copper (See column 5, lines 6-9).

Chun further discloses, “A preferred mode of operation is to use the iron group metals in their higher oxidation states” (Column 4, lines 57-59). This indicates that the degree of oxidation is at least 2.

7. With respect to claim 5, Chun discloses that that the metal cation is used in the form of halide, nitrate, sulfate, and suitable organometallic compounds of cobalt, nickel and iron (See column 4, lines 36-40). Chun’s disclosure also shows atoms of nitrogen, sulfur and/or oxygen as the coordinating element (See column 4, lines 41-49).

8. With respect to claims 10 and 11, Chun invention discloses that the supported metal cation is obtained by bringing the solid into contact with metal cation salts in the form of an aqueous or organic solution, the salts being selected from the nitrates, sulfates and halides of metals, including iron and copper such as ferric chloride and cuprous chloride (See column 4, lines 30-71; column 7, lines 41-70).

9. With respect to claim 12, Chun invention discloses that iron should be less than 60 wt% and copper should be 2 to 50 wt% (See column 5, lines 56-60; column 6, lines 2-4).

10. With respect to claim 13, Chun invention discloses using a fixed bed of catalyst (See column 7, lines 31-34; column 8, lines 20-23).

11. With respect to claim 14, Chun invention discloses removal of the polymers deposited on the solid supporting the cation comprises extracting these polymers by passing air at atmospheric pressure through the catalyst bed at a temperature of about 500^{o}F for about 40 minutes to remove gum and to replenish the oxygen in the lattice structure of the catalyst (See column 6, lines 74-75; column 7, lines 1-4). Chun also discloses that reactivation of the catalyst is done after removal of light hydrocarbons present in the system (See column6, lines 69-71; column 7, lines 31-36).

12. With respect to claim 16, Chun invention discloses restoring the metal cations to a degree of oxidation of at least 2 by oxidation, by injecting air and simultaneously increasing the temperature of the oxidizing agent (See column 4, lines 57-62; column 6, lines 72-75; column 7, lines 1-2).

13. With respect to claim 17, Chun invention discloses, "It is advantageous to employ multiple reactors which are alternately on stream. This permits reactivation of one catalyst bed while the other or others continue to function" (Column 6, lines 69-70). This clearly shows that the process can be conducted either in batch or continuous mode.

Claim Rejections - 35 USC §103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

15. Claims 3, 6-9, 15 and 18-21 are rejected under 35 U.S.C. 103(a) as obvious over Chun et al (US Patent 3,746,637).

16. With respect to claim 3, Chun invention does not specifically disclose the redox potential of the oxidizing metal cation, however, it is to be noted that Chun uses similar

metal cations as claimed by the Applicant. Thus, it is expected that the redox potential in Chun invention also will be similar to the claimed invention and it would have been obvious to one skilled in the art at the time of invention to modify Chun invention and specify the redox potential of the oxidizing metal cation for its proper characterization.

17. With respect to claim 6, Chun invention discloses that the metal cation is introduced in solution and the polymer is formed (See column 1, lines 36-43).

Chun invention does not specifically disclose the method of separation of the oxidizing cations from polymers, however, the invention does disclose recovery of "doctor sweet" product (See column 7, lines 21-36). Thus, it would have been obvious to one skilled in the art to modify Chun invention and use any appropriate device for product separation from the metal cations, including decanting, filtration or extraction, as claimed, because any appropriate separation technique is expected to be equally effective.

18. With respect to claims 7-9, Chun invention does not specifically discloses different supports as claimed, however, the invention does disclose copper catalyst with silica as the support with specific surface area of 430 m^2/g (See column 7, lines 66-70). Chun also discloses using various supports (See column 1, lines 41-43). Thus, it would have been obvious to one skilled in the art at the time of invention to modify Chun invention and use any appropriate support including as claimed, because they are all

expected to be functionally similar. It would also have been obvious to one skilled in the art at the time of invention to specify the pore size of the support for proper characterization of the catalyst.

19. With respect to claim 15, Chun invention does not specifically disclose removal of polymers as claimed, however, the invention does disclose recovery of “doctor sweet” product (See column 7, lines 31-36). Thus, it would have been obvious to one skilled in the art at the time of invention to modify Chun invention and remove the polymers (gum) from the treated hydrocarbon by any standard technique, including as claimed, for high quality product recovery.

20. With respect to claim 18, Chun invention does not specifically disclose reuse of the cation, however, the invention does disclose reactivation of the cation after use (See column 7, lines 2-4). Thus, it would have been obvious to one skilled in the art at the time of invention to modify Chun invention and reuse the cation in the first stage and reduce the amount of fresh make-up catalyst and thus make the process more economical.

21. With respect to claims 19-21, Chun invention discloses application of the oxidative desulfurization method for any hydrocarbon stream boiling in the range of 50-700oF, including industrial streams like gasolines, naphthas, kerosene and heavy distillate fuel oils (See column 6, lines 21-31). Although Chun invention does not

specifically disclose the application for the FCC and pyrolysis gasolines and aromatic effluents such as BTX, however, the invention does disclose the application of the process for any gasoline and naphtha, which could be obtained from a FCC or pyrolysis process. It is to be noted that higher boiling hydrocarbons disclosed by Chun also include aromatics (evidenced by Sparks, US Patent 3,352,777: column 1, lines 38-44). Thus, it would have been obvious to one skilled in the art at the time of invention to modify Chun invention and give finishing treatment to aromatic effluents and produce desulfurized aromatics.

Conclusion

22. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Carr et al (US Patent 3,491,020).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PREM C. SINGH whose telephone number is (571)272-6381. The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PS 120308

/In Suk Bullock/
Examiner, Art Unit 1797